POSTER SESSION

1017 Biventricular Pacing: Implant Technique and Mechanisms

Sunday, March 17, 2002, 9:00 a.m.-11:00 a.m.
Georgia World Congress Center, Hall G
Presentation Hour: 10:00 a.m.-11:00 a.m.

1017-103 Cardiac Resynchronization Improves Ventricular Function and Symptoms of Congestive Heart Failure in the Absence of Any Mechanical Atrial Contribution

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BACKGROUND: Some authors attribute the benefit of cardiac resynchronization therapy (CRT) to optimization of atrioventricular (AV) interaction in the patient with conduction delay and congestive heart failure (CHF). Whether CRT in the absence of active AV transport improves ventricular function remains unproven. Upgrade to biventricular pacing (BVP) long after His bundle ablation and right ventricular (RV) pacing in patients with atrial fibrillation (AF) allows an assessment of CRT independent of the acute effect of ventricular rate control or atrial contribution to cardiac function.

METHODS: Twenty consecutive patients (17 men) with severe CHF (ejection fraction ≤0.35, NYHA class III (12) or IV (8)), prior AV junction ablation, and RV pacing performed for permanent AF of at least six months duration underwent upgrade to BVP. Analysis of ECGs, echocardiograms, and functional status before and at three to six months after upgrade assessed the effects of BVP.

RESULTS: Duration of RV pacing prior to the upgrade was 26.4 ± 12.2 months.

	Pre BVP	Post BVP	Significance
NYHA class	3.4 ± 0.5	2.4 ±0.6	p<0.001
Hospitalizations	1.9 ± 0.8	0.4 ± 0.6	p<.001
QRS width (ms)	213 ± 40	172 ± 31	p<0.0001
EF (%)	21.5 ± 6.9	30.9 ± 11.5	p<0.001
LVEDD (mm)	67.9 ± 8.3	63.5 ± 7.7	p<0.003
LVESD (mm)	56.3 ± 9.8	51.5 ± 10.9	p<0.01

CONCLUSION: Absence of active atrial transport and AV timing considerations permits a pure assessment of ventricular resynchronization. BVP improves LV function, reduces hospitalization, and improves symptoms of CHF in patients with permanent AF and chronic RV pacing. The magnitude of effect compares favorably to those described in patients with sinus rhythm. BVP acts through ventricular resynchronization rather than optimization of the AV delay.

1017-104 Why Do Left Ventricular Lead Implants Fail?

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Background: Biventricular pacing in patients with NYHA Class III and IV heart failure and a wide QRS (> 130 ms) has shown significant benefit in randomized studies. Implantation of left ventricular leads (LVL) for biventricular pacing via the coronary sinus and coronary veins is technically more difficult and has a higher rate of failure during long term follow up than RV lead implantation. In order to better understand the reasons for failure and the challenges for implanters, we have analyzed implantation data from 797 patients enrolled in MIRACLE and InSync III trials.

Methods: Databases for MIRACLE and InSync III trials were analyzed for patient demographics and history for successful and unsuccessful LVL implants to review any differences between these groups. These databases were also queried for unsuccessful LVL implant attempts and the reasons for being unsuccessful.

Results:

	MIRACLE		InSync III		Total	
Total patients	579		218		797	
Failed LVL implants	43		9		52	
	Male	Female	Male	Female	Male	Female
Successful	373	163	124	85	497	248
Unsuccessful	21	22	4	5	25	27
Success Rate	94.7%	88.1%	96.8%	94.4%	95.2%	90.2%
p-value - success rate by gender	0.005		0.487		0.006	
Reason for LVL implant failure**						
Unable to access CS	7		5		12	
Unable to select vein with stable position	44		3		47	
Unable to access subclavian vein	8				8	
High Thresholds	6		3		9	
Phrenic Nerve Stimulation	2				2	

* * Reasons for failure are not mutually exclusive and for certain patients more than one implant attempt was made.

Conclusion: The most frequent reason for unsuccessful LVL implants was the difficulty to locate a coronary vein of adequate size and to access the coronary sinus. Significantly lower success rates in women can be probably explained by a smaller vein size.

1017-105 Upgrade of Pacemakers to Biventricular Systems in Congestive Heart Failure: Comparison to Primary Biventricular Implantation

Cindy M. Baker, Angel R. Leon, David B. DeLurgio, *Carlyle Fraser Heart Center, Emory University School of Medicine, Atlanta, Georgia.*

A recent randomized biventricular (BV) trial (MIRACLE) confirms that BV pacing improves congestive heart failure (CHF) symptoms and quality of life in New York Heart Association (NYHA) class III-IV patients with interventricular conduction delay. Our study compares NYHA III-IV patients with prior ventricular pacemaker dependence in whom we add a transvenous left ventricular lead (UPGRADE) to patients receiving a primary BV system. We hypothesize that UPGRADES will achieve similar narrowing of QRSd and improvement in NYHA class at three month follow up. Sixty UPGRADE and MIRACLE patients were matched for baseline variables. The absolute and % change in QRSd with BV pacing is calculated. NYHA class at baseline and three months are compared. The groups are similar except a longer QRSd at baseline in UPGRADES. Absolute and % change in QRSd is greater in UPGRADES (p=0.007 and 0.019). NYHA class is significantly improved in both groups (p < 0.001). Upgrade to BV pacing results in greater shortening of QRSd and improvement in NYHA class equal to MIRACLE patients. Addition of an left ventricular lead to conventional pacing systems is an effective therapy for patients with CHF.

Comparison of MIRACLE and UPGRADE Patients

	MIRACLE (n=30)	UPGRADE (n=30)	P Value
Age	67 +/- 12	69 +/- 12	NS
% Male	70	80	NS
Ejection Fraction	21 +/- 6	22 +/- 8	NS
Quality of Life Score	70 +/- 17	81 +/- 16	NS
NYHA Class	3.2 +/- 0.4	3.4 +/- 0.5	NS
QRSd	173 +/- 22	202 +/- 36	<0.001
BV QRSd	154 +/- 20	165 +/- 33	NS
Absolute Change QRSd	18 +/- 24	37 +/- 29	0.007
% Change QRSd	9 +/- 14	18 +/- 12	0.019
3 Month NYHA Class	2.35 +/- 0.7	2.4 +/- 0.7	NS

(p<0.001 in comparison of baseline and 3 month NYHA for MIRACLE and UPGRADES)

1017-106 Procedure Time and Success Rate for the Placement of a Coronary Venous Lead Designed for Left Ventricular Pacing

Steven Higgins, Michael Giudici, John Hummel, Emile Daoud, Seth Worley, Lisa Grant, *Guidant, Inc, St. Paul, Minnesota.*

Background: The VENTAK® CHF/CONTAK™ CD Study is a prospective, randomized study to determine if cardiac resynchronization therapy (CRT) is safe and effective in patients (pts) with general indications for an ICD, symptomatic heart failure, left ventricular (LV) dysfunction (ejection fraction<35%), and interventricular conduction delay (QRS>120 ms).

Methods: A total of 448 pts were implanted with a CRT system with backup defibrillation capability, utilizing the EASYTRAK® coronary venous (CV) pace/sense lead. This lead was advanced into the CV vasculature using over-the-wire techniques. Total "skin-to-skin' procedure time was recorded for each implant procedure. Procedure times and implant success rates were divided into quartiles based on the implant order for each center.

Results: At implant pts were characterized as 83% male, mean age 66 ± 10 years, NYHA II (33%), III (58%), IV (9%), mean LV ejection fraction 21±7%, mean QRS width 158 ± 28 ms. The average procedure time was 175 ± 85 minutes (min) for all pts. Implant times significantly decreased from 216 ± 83 min in the first quartile to 117 ± 64 min in the fourth quartile (p<0.001). Implant success as well as the ability to cannulate the ostium of the coronary sinus also improved with increasing experience.

Quartile	1st	2nd	3rd	4th	Total
Implant	1-4	5-7	8-15	>15	All
Average Implant Time ± SD	216 ± 83	191 ± 85	166 ± 75	118 ± 64	175 ± 85
Implant Success Rate	85%	82%	88%	91%	87%

Conclusions: CV leads can be placed with a high degree of success using over-the-wire techniques. The procedure time, ability to locate the ostium of the coronary sinus, and implant success rate all improve with increasing investigator experience.